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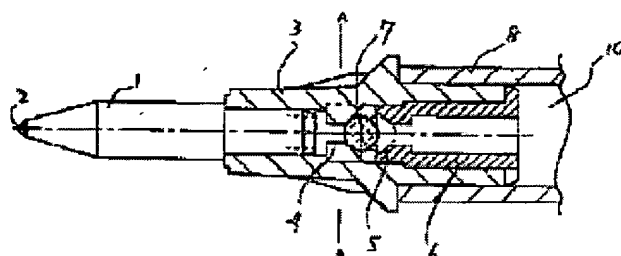
WRITING IMPLEMENT

Patent number: JP10236063
Publication date: 1998-09-08
Inventor: FURUKAWA KAZUHIKO
Applicant: MITSUBISHI PENCIL CO LTD
Classification:
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Abstract of JP10236063

PROBLEM TO BE SOLVED: To solve the problem of a counterflow mechanism for ink having heavy and large grains with a coloring agent employed, a heavy specific gravity, and a high viscosity by making a specific gravity of a check ball moving in accordance with gravity within a check mechanism smaller than a specific numeric value, and setting it larger several times than the gravity of ink.

SOLUTION: A check ball 7 is loosely fitted in the tapered sealing surface of a sealing member 6 being forcibly fixed in the rear inner part of a coupling 3 forcibly inserted in the tip end side of an ink reservoir pipe 8, thereby clogging the ink flow path through close contact and preventing ink from counterflowing. The gravity G of the check ball 7 or a nonspherical check member at the rear end is $11 > G > 3 \times W$ in the specific gravity W of ink held in the inner part, namely, material has the heavier gravity three times than the gravity of ink, and the material does not exceed the gravity 11. Then, the ink viscosity is made 100-20000cp at 23 deg.C, an average grain size of a coloring agent is $0.30-3.0\mu m$, water is contained 50% or more, and the specific gravity of ink containing a 3-40% volatility retardant solvent is made 1.1-2.0.



PATENT ABSTRACTS OF JAPAN

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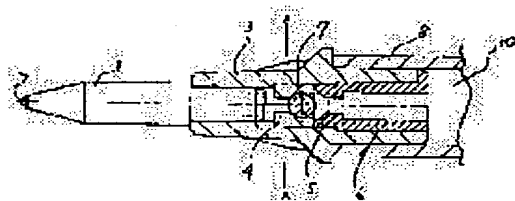
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CLAIMS

[Claim(s)]

[Claim 1] It has an ink hold pipe behind [of having escaped possible / rotation /, having stopped and having fitted in loosely in the state where the ball used as the writing section was made to **** from a nose of cam] a nib. the ball-point which preserves ink directly to the interior — setting — air substitution — ahead [nib side] rather than a hole When a nib changes into facing up or the state where it does not write down, blockade ink passage and an adverse current is prevented. And it has the so-called antisuckback mechanism in which the ink passage for a note is secured when a nib changes into facing down or a writing state. In the specific gravity W of the specific gravity G of the nonreturn coma of the non-spherical which has the slot or narrow diameter portion which secures ink passage to a field [which closes a sealing surface to the spherical nonreturn ball or the spherical back end which fits loosely into the interior possible / movement], and nose-of-cam side, and the ink preserved inside The writing implement of the ball-point type characterized by being $11 > G > 3XW$.

[Claim 2] The nib which has capillary tubes which followed shaft orientations, such as a variant cross section and a fiber bundle, and covered the outside with the resin metallurgy group of non-permeability is made into the writing section. In the so-called felt-tipped marker and so-called marker which have an ink hold pipe behind a nib and preserve ink directly to the interior When a nib changes into facing up or the state where it does not write down, blockade ink passage and an adverse current is prevented. And it has the so-called antisuckback mechanism in which the ink passage for a note is secured when a nib changes into facing down or a writing state. The specific gravity G of the nonreturn coma of the non-spherical which has the slot or narrow diameter portion which secures ink passage to a field [which closes a sealing surface to the spherical nonreturn ball or the spherical back end which fits loosely into the interior possible / movement], and nose-of-cam side The felt-tipped marker, the marker type writing implement which are characterized by being $11 > G > 3XW$ in the specific gravity W with the ink preserved inside.

[Claim 3] The ink viscosity in a general shear rate is set at 23 degrees C. 100 to 20000cp(s), and nothing, The mean particle diameter converted into the sphere as a coloring agent is 0.30 micrometers. 3.0 micrometers of shells It has ink which distributed inorganic substances, such as metal powders, such as at least one or more sorts of aluminum, or a mica. In the ink, viscosity is still higher than water, such as ethylene glycol, a propylene glycol, and a glycerol, 50% or more in water as a main solvent. The writing implement according to claim 1 or 2 characterized by the specific gravity of the ink which contains at least one or more sorts for the difficulty volatilization solvent which cannot volatilize easily rather than water 40% or less 3% or more in total as an auxiliary solvent building in or more 1.1 the ink it is [ink] 2.0 or less.

[Claim 4] The joint which constitutes an antisuckback mechanism and is formed between a writing section nose of cam and the ink hold pipe back end is a writing implement according to claim 3 from the claim 1 characterized by having the joint which establishes the gate for fabrication neither in the pressing section of the product made of synthetic resin, and a nothing and an ink hold pipe nor the ink passage of a nonreturn mechanism nor the near front face of a nonreturn sealing surface.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention has the nib which is the writing section, and often poses a problem in containers, such as a writing implement of the type which preserves liquids, such as ink, directly in an ink hold pipe, or writing implement-like cosmetics. When the time of not writing down and a nib are turned upward, ink flows to a back end side. it is improvement about the writing implement which has the antisuckback mechanism in which the so-called adverse current which begins to leak from a vent is prevented, and in order to make ten parts demonstrate the flow and the antisuckback effect of ink at the time of a note especially, it is related with improvement which prevents that deformation destruction of the internal mechanism is carried out at the time of assembly

[0002]

[Description of the Prior Art] Although many mechanisms in which carry out occlusion of the liquids (it is henceforth called ink), such as ink, to the fiber bundle called cotton pad, and a nib is made to draw ink using the difference of the vas-capillare force have been conventionally used with containers, such as cosmetics similar to a writing implement or a writing implement Although there are many residues of ink, ink does not appear but there are many ink flow rates the first stage, since there is a fault of becoming thin according to use, conventionally, various invention is carried out and Kamiichi of the writing implement of the type which preserves the ink which was the mechanism of only an oily ball-point in a direct ink hold pipe is carried out. However, when carried out and turn the long term storage of the nib upward, vibration is given or it writes down upward, it is known for the type which preserves this ink directly that there is a problem which the ink called adverse current begins to leak from the vent of the back end, and becomes writing impotentia or soils dress. Although the object which made ink the hyperviscosity of 5000 or more cps, or prepared the grease-like follower in the back end further is also seen in order to solve this, these do not serve as fundamental solution, but these people and the artificer are indicating invention (JP,4-52067,Y, JP,6-68874,U, JP,7-28675,U, JP,7-237386,A, etc.) of the combination of the ball called antisuckback mechanism, the combination of a valve and a spring, and the ball notes of is taken etc. Although these invention is invention of the thing already marketed as a product, and its development improvement Recent years further, in ink, such as gold, silver, and a pastel color, although the ink which distributed particles, such as a metal powder and an inorganic substance, and the pigment system coloring agent with big specific gravity has been developed 0.3 micrometers surely comparatively big in order to secure the coloring nature of a particle in these ink 3 micrometers of shells In order to have to use the coloring agent of the particle size of a grade and to pass this a little big particle, Moreover, in order to have to consider as the ink which raised viscosity rather than others and the general color in order to distribute a particle with big specific gravity, The specific gravity of the problem and ink in which derivation of ink becomes difficult goes up 10 to no less than 100% rather than a general color. In the case where, and the nest of air was located inside or air adheres to a surface micropore [that a nonreturn ball is the material of light specific gravity] The problem to which the sensitivity of an operation of the mechanism in the antisuckback mechanism in which

movement of a nonreturn ball takes time, air enters at the nose of cam of a nib so much, and fault is caused becomes blunt, When the specific gravity of a nonreturn ball is too heavy, in case it is centrifugal degassing, intensity is insufficient, or chemical resistance was insufficient, there is no thermal resistance and the passage of a nonreturn mechanism has produced [**** / that it is weak] the problem which is easy to transform and by which a nonreturn mechanism is destroyed at the time of manufacture. When there is much volatilization of the moisture from a nib or a vent at the time of use, there is also a problem on which specific gravity and viscosity go up further, and a nonreturn mechanism does not operate effectively. Although volatilization suppression of moisture, ink-proof nature, thermal resistance, and a moldability are thought as important and resin fabrication parts, such as polypropylene, a polyacetal, and a denaturation polyphenylene ether, are used in the further conventional joint in this case, the time of fabrication — metal mold — the restoration when being filled up inside — depending on the position of the gate used as a hole It was divided from the place, or gate dregs small at the time of an assembly floated [**** / that ink leaks] in ***** ink by having attached the blemish at the gate which remained in the shape of a salient at the time of insertion, and the problem which is got blocked in the nib section and starts writing impotentia with a note is also produced.

[0003]

[Problem(s) to be Solved by the Invention] Then, when it not only solves the problem of an adverse current of ink, but this invention mainly aims at improvement of an prevalent writing implement and the problem of note nature is not generated in combination with various kinds of ink, it is water ink by which Kamiichi is carried out in recent years. Although Kamiichi of the inside viscosity type **** type ball-point with viscosity lower than the ink used with the usual oily ball-point and viscosity higher than cotton pad formula water color ink is carried out When it considers as ink at these, the viscosity of ink tends to move ink with a degree in the middle. Air tends to enter in a nib with the shock under preservation and movement, and the problem of the antisuckback mechanism in the ink of viscosity heavy [a little] specific gravity and higher which used the coloring agent with them for before the state where an antisuckback mechanism fully demonstrates a function is solved. [heavy problem or particle of the air to the nib section which carry out contamination generating and] [large] Offer the writing implement which furthermore does not serve as a complicated mechanism in consideration of assembly nature or performance stability and which it is cheap and neither an adverse current nor a skip produces. The technical problem that the writing implement which produces a problem neither for note nature nor an antisuckback performance is offered when the problem of the ink leakage by swelling or the crack and the nib section have furthermore dried during destruction of the nonreturn mechanism at the time of manufacture, the problem of ink leakage, and preservation is solved.

[0004]

[Means for Solving the Problem] In the writing implement of the type which has the nib which is the writing section and preserves liquids, such as ink, directly in an ink hold pipe, or writing implement-like cosmetics In order to attain the above-mentioned technical-problem solution, the writing implement of this invention It is used for a nonreturn mechanism and its attention is paid to the specific gravity G of the parts (it is henceforth called a nonreturn ball) of the nonreturn coma of the spherical nonreturn ball which moves in the inside of a nonreturn mechanism according to gravity, or a non-spherical, and the specific gravity W of ink. Between each specific gravity set to 1, smaller than 11, the specific gravity W of ink is larger than 3 times (heavily), and the specific gravity G of a nonreturn ball set up the specific gravity of water. There is the slot or salient which can secure passage when it fits in loosely and a nonreturn ball moves a nonreturn ball to the interior of a joint as composition of a nonreturn mechanism at a nib side. The mechanism in which ink passage is blockaded by the sealing surface within a joint or a seal coma, and an adverse current is prevented by it when a nonreturn ball moves to a back end side, The nonreturn mechanism which fitted in the nonreturn ball loosely in the nib, and narrowed down the back end of a nib so that a sealing surface might be formed, It blockades [by pressing a writing ball by the spring from back with the writing implement of the ball-point type which fitted in the ball used as the writing section of a nib loosely between the caulking section at a nose of cam,

and the receptacle seat which has back ink passage] with the caulking wall and writing ball by the side of a nose of cam at the time of un-writing down. The object which made the type of the spring chip which prevents an adverse current, and the nonreturn ball a nonreturn coma with [ink passage / front end / not a sphere but] / the sealing surface in the back end can be used. Furthermore, since coloring agents, such as mist, a metal with specific gravity heavier than ink with a large particle, and non-equipments, are used from the 0.3 to 3-micrometer usual pigment, or the color by the mean particle diameter into ink in the case of ink, such as gold and silver It is necessary to make viscosity of ink a little higher than other pigment ink and color ink in the ink of a heavy particle by these slight size. The specific gravity of ink is heavier than common ink the top in these cases where resistance of the flow of the ink in the interior is strong. Since the sensitivity of the antisuckback mechanism in which air enters from the nose of cam of a nib is influenced before an antisuckback mechanism will operate completely, if the movement of a nonreturn ball becomes late, it is very effective to consider as the composition of the nonreturn mechanism of this invention. Although the solvent of difficulty volatility was used for ink rather than water as an auxiliary solvent in order to prevent that thicken because the nib section dries, and viscosity and specific gravity become high further, by this invention, the solvent with viscosity higher than water was blended 40% from 3% in the one or more kind sum total. Moreover, when the joint formed between a nib nose of cam and the ink hold pipe back end was used, by making the quality of the material of this joint into the product made of synthetic resin, it is possible to form the ink passage and the seal section of a nonreturn mechanism, and it considered as the joint which establishes the position of the gate for fabrication at that time neither in the pressing section with an ink hold pipe nor the ink passage of a nonreturn mechanism nor the near front face of a nonreturn sealing surface.

[0005]

[Example] Hereafter, it explains in full detail about the illustrated example. Drawing 3 shows the 1st example of this invention from drawing 1 . It is the **** type refill which is the writing implement which preserves ink and held the viscosity ink in water in the interior of transparence or the ink hold pipe made of a translucent resin as shown in drawing. While giving the shearing adhesiveness-reducing nature called pseudoplasticity, a follower and the follower rod made of resins, such as PP which has the specific gravity of an abbreviation EQC, and PE, are built in so that it may float to viscosity ink, the follower of the shape of grease which cannot volatilize easily in refill back, and a follower. While escaping from a writing ball by the periphery-like caulking section inside, stopping inside and being made inside the chip holding the writing ball used as the writing section, it fits in loosely free [rotation of a writing ball], and the interior of a nib has secured passage required for a note. The joint is pressed fit in the ink hold pipe nose-of-cam side, the receptacle salient which has the ink introduction slot which has a cross section like drawing 2 in the internal center of abbreviation is prepared, it receives to a nib, and ink is led by the slot on the salient. Pressing fixation of the seal coma is carried out inside back at this joint, and a taper-like sealing surface is formed in a seal coma. After considering as the structure which opens for free passage even the ball which serves as the writing section from the ink hold section at the time of the usual note with the nonreturn ball which fitted in loosely in the valve chest which receives with this sealing surface and is formed between the slots on the salient Upward, when a nonreturn ball is close to a sealing surface, it is a ball-point with the antisuckback mechanism of structure in which the adverse current was prevented by ink passage being blockaded and preventing movement of ink.

[0006] For the ink currently used here, the mean particle diameter when converting into a sphere as coloring agents, such as common inside viscosity ink, common gold and silver, etc., is 0.3 to 3 micrometers. Using scale-like aluminum powder, it is about the viscosity of 23-degree C ink at the high shearing time, is from 100 at the 500cp(s) and low shearing time, and has the shearing adhesiveness-reducing nature of 20000cp(s) from 200. Although common ink is about 1.2 from specific gravity 1.03, in gold-and-silver ink, specific gravity is heavier than water and the specific gravity of ink becomes heavy by further various kinds of add-in material being added from specific gravity 2.5, when about three heavy aluminum powder and mica powder are contained about 15% of the weight from 3 % of the weight. In order not to make the flow of ink produce

resistance also as ink of the comparatively higher viscosity as heavy large inside viscosity ink of such a particle, it considered as a setup which optimized the minimum projection cross section of the passage of a nonreturn mechanism. Here, water and a common solvent adjust other additives from it being difficult to be before and after specific gravity 1, and to carry out to one or less, and the specific gravity of ink is used as the ink of the specific gravity of 1.1 to 2.0. the time of facing up in a nonreturn ball sedimenting according to gravity in ink — back — moving — ink — the hole was blockaded, and since the operation of an antisuckback mechanism was carried out by moving to the front which can secure ink passage at the time of facing down, although specific gravity [at least] heavier than ink was indispensable, in this invention, it considered as the quality of the material which does not exceed the quality of the material of specific gravity with specific gravity heavier than 3 times and the specific gravity 11 of ink. Although it specifically changes with ink, the stainless steel which has the corrosion resistance over ink with the quality of the material of specific gravity 3.3 to the specific gravity 11, copper, brass, a zirconia ceramic, the resin containing a metal, etc. can be selected. It compares with ink specific gravity. when the specific gravity of a nonreturn ball is not enough (3 or less times of ink specific gravity) It takes time when the speed of sedimentation turns upward late, until a nonreturn ball contacts a sealing surface and blockades. The problem on which a nonreturn mechanism operates after the surrounding ink of the nonreturn mechanism section moves back and air enters into a nib (state where the so-called sensitivity is bad) occurs. In order to apply the centrifugal force of 3000G from 10G when many, when assembling if the specific gravity of a nonreturn ball is too heavier than 11, and carrying out [inner] centrifugal degassing, A nonreturn ball a receptacle salient in a joint in order to stop attaching [it is hard and] and moving and to destroy a receptacle salient, when the portion which receives the weight of a nonreturn ball by the anterior is made into the product made of synthetic resin. It is more advantageous to use the specific gravity of a nonreturn ball as the object which does not exceed 11 in a general writing implement, since a rigid high object is considerably required of the quality of the material of the resin in respect of cost.

[0007] The nib which has capillary tubes which followed shaft orientations inside the nib as the 2nd example of this invention as shown in drawing 4 , such as a variant cross section and a fiber bundle, and covered the outside with the resin metallurgy group of non-permeability is made into the writing section. It is what was used as the so-called felt-tipped marker which has an ink hold pipe behind a nib and preserves ink directly to the interior, or the marker, and the composition of a nonreturn mechanism is supposing that it is completely the same as that of the 1st example, and an effect is the same object as the 1st above-mentioned example. Moreover, the writing implement which was made to carry out eccentricity of the valve chest in a joint about a nonreturn mechanism, and was considered as the composition which does not close a nib back end bore even if a nonreturn ball moves ahead may be used.

[0008] As the 3rd example of this invention, as shown in drawing 5 , it is the object made into the nonreturn mechanism of the structure of building in Chips pulling pressed by the about 1 to 40g load, forming a ball-valve mechanism with periphery-like the caulking section and the writing ball used as a sealing surface with a writing ball, and making a shock-proof rise, volatilization prevention of ink, and the adverse current of ink preventing. This Chips pulling is usually $\phi 0.3$ — $\phi 1$. In order to press the very small writing ball of 2 directly, it is in a point as a spring which prepared the bay in one, and the back end section of a chip is escaped from, stopped and carried out with caulking for the omission stop. The nonreturn ball in this case is a writing ball at a nose of cam, and an effect is demonstrated by satisfying the composition of this invention. When the nose-of-cam sealing compound 16 of the hot-melt type furthermore fused at 80 to 150 degrees C at a nose of cam for the purpose of the nib protection and volatilization prevention under transportation is made to adhere, the trouble by the rise of mothball nature or transportation to a user can be prevented.

[0009] As shown in drawing 6 as the 4th example of this invention, it has the taper section which is not a nonreturn ball and blockades a sealing surface in a back end side, and further, it is what was made into a nonreturn coma with the slot or salient which serves as ink passage ahead [nib side], and has the same effect by satisfying the composition of this invention. Furthermore, the

gate of injection molding of a joint is established in the external maximum outer-diameter section here, and it has composition which does not produce which unusual problem of the ink leakage or the crack by the residual stress near the gate about the gate at the time of assembly, or a sealing surface by having considered as the portion which it is not the pressing section with an ink hold pipe, the pressing section with a nib, and near the nonreturn mechanism.

[0010] As a concrete example of an experiment, in the combination of the nonreturn ball made from aluminum of specific gravity 2.58, time difference arises in movement of a nonreturn ball in the black ink of specific gravity 1.1, and air goes into a nib. Although air entered very slightly with the nonreturn ball made from a zirconia ceramic of specific gravity 3.5, for real use, satisfactory Satisfactory at all, with the nonreturn ball made from a tungsten of specific gravity 19, in centrifugal degassing at the time of manufacture, the receptacle salient inside a joint deformed and the problem arose to note nature at with a specific gravity of 6.5 or more stainless steel or copper. Moreover, in the golden ink of specific gravity 1.9, the problem occurred with aluminum and the zirconia ceramic, with stainless steel or copper, satisfactory, it is the same as the above and the interior of a joint has been destroyed by the product made from a tungsten. Ink itself dissociates at the time of centrifugal degassing, and, as for distribution of a component, the specific gravity of ink is impossible in what was made heavy to 2.5 at it. In what carried out the amount of solvents of ink in addition to the range of this invention, when saved by evaporation of the moisture from the nib section, thickening of ink occurred, and the problem of the ink of space stopping getting dry etc. arose. The object which does not use a joint, but fits a nonreturn ball loosely into the interior of a nib as other examples (not shown), was made to form a sealing surface in the method of the inside of the direction of a path for the back end of a nib over a perimeter, and stop escaping from the nonreturn ball and carried out it, The same effect of this invention is expected also with the writing implement of the example of the object which did not make the straight section of the object which used the receptacle salient with the ink introduction slot in a joint as another parts, or Chips pulling, but took out the spring from the nib as a push coma of another parts, and received inside the joint.

[0011]

[Function] An operation of this invention is explained in an example. Although it was thought by having an antisuckback mechanism that the adverse current of a writing implement could generally be prevented, when various ink in recent years is used, it is becoming high specific gravity too much not much about the specific gravity of a nonreturn ball and ink, after fully attaching a difference, and not producing a problem in the case of centrifugal degassing of assembly, and troubles, such as a problem which delay produces in the operation of a nonreturn mechanism, and destruction of the parts at the time of manufacture, can be prevented. It becomes possible to consider as the antisuckback mechanism which stabilizes and operates, without being influenced by unexpected buoyancy even if there is a still finer nest inside a nonreturn ball or fine air bubbles are attached to the surroundings. The operation which can prevent operation delay of a nonreturn mechanism upwards by furthermore making the specific gravity of ink, viscosity, the particle size of a coloring agent, and the kind and amount of a solvent into the range of this invention though ink stops being able to become high specific gravity further easily due to volatilization of the nib section while confirming the operation of a nonreturn mechanism, and prevents a skip and an adverse current according to these interactions is expectable. Moreover, it is possible for a writing implement without the influence of a nonreturn mechanism or ink leakage to be cheaply obtained by limiting the gate section of a joint, and to consider as an effective writing implement.

[0012]

[Effect of the Invention] the composition and an operation of a writing implement of this invention are like the above, and the effect which does not cause serious accident, such as an adverse current which soils dress, becomes possible [it not only satisfying the function of a dovetail and the high writing implement of safety, but offering the writing implement which can perform a user's use simple and which is easy to use] Furthermore there is also no problem on manufacture and it becomes possible to consider as the writing implement which was common in all the ink that does not therefore need to combine various kinds of parts of an ink kind, and it is

cheap and part composition is not only simplified, but can offer the stable product which had the good long-term endurance of functionality taken into consideration.

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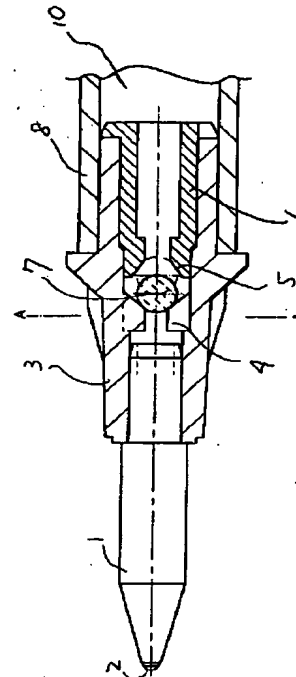
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(54)【発明の名称】 筆記具

(57)【要約】

【目的】 従来の直液式筆記具の逆流防止機構を改良であり、逆流防止機構の作動遅れを防止する機構の改良を目的とする。特に着色剤の粒子が比重が重く大きい中粘度インクの場合にも確実かつ安価で性能の良い筆記具を製造上や長期保存性にも問題のない筆記具を提供する事を目的とする。

【構成】 逆流防止機構のインクと逆止ボールの比重を最適化した上で、インク粘度や着色剤粒径、溶剤種と溶剤量を限定することで総合性能に優れた筆記具とする。さらに合成樹脂製の継手のゲート位置を限定することで、逆止機構の問題やインク漏れの問題のない筆記具とする。



【特許請求の範囲】

【請求項1】 筆記部となるボールを先端から臨出させた状態で回転可能に抜け止め遊嵌したペン先の後方にインク収容管を有し、その内部にインクを直接保蔵するボールペンに於いて、空気置換孔よりもペン先側前方には、ペン先が上向き又は非筆記状態になった場合にはインク流路を閉塞して逆流を防止し、かつペン先が下向き又は筆記状態になった場合には筆記のためのインク流路を確保する所謂逆流防止機構を有しており、内部に移動可能に遊嵌される球状の逆止ボール又は後端にシール面を塞ぐ面と先端側にインク流路を確保する溝又は小径部を有する非球状の逆止コマの比重 G と内部に保蔵されるインクとの比重 W において $1.1 > G > 3 \times W$ である事を特徴とするボールペンタイプの筆記具。

【請求項2】 軸方向に連続した異形断面や繊維束等の毛細管を有し外側を非浸透性の樹脂や金属で被覆したペン先を筆記部としており、ペン先の後方にはインク収容管を有してその内部にインクを直接保蔵する所謂サインペンやマーカーに於いて、ペン先が上向き又は非筆記状態になった場合にはインク流路を閉塞して逆流を防止し、かつペン先が下向き又は筆記状態になった場合には筆記のためのインク流路を確保する所謂逆流防止機構を有しており、内部に移動可能に遊嵌される球状の逆止ボール又は後端にシール面を塞ぐ面と先端側にインク流路を確保する溝又は小径部を有する非球状の逆止コマの比重 G と、内部に保蔵されるインクとの比重 W において $1.1 > G > 3 \times W$ である事を特徴とするサインペン、マーカータイプの筆記具。

【請求項3】 一般的な剪断速度でのインク粘度を 2.3°C において 100 から 20000cp となし、着色剤として球に換算した平均粒子径が $0.30\mu\text{m}$ から $3.0\mu\text{m}$ の少なくとも1種以上のアルミ等の金属粉又はマイカ等の無機物を分散させたインクを有し、そのインクには主溶剤として水を 50% 以上、さらにエチレングリコールやプロピレングリコールやグリセリンなどの水よりも粘度が高く、水よりも揮発しにくい難揮発溶剤を補助溶剤として少なくとも1種以上を合計で 3% 以上、 40% 以下含むインクの比重が 1.1 以上 2.0 以下であるインクを内蔵する事を特徴とする請求項1又は請求項2に記載の筆記具。

【請求項4】 逆流防止機構を構成し、筆記部先端とインク収容管後端との間に設けられる継手は合成樹脂製となし、インク収容管との圧入部や逆止機構のインク流路や逆止シール面の近傍表面には成形用のゲートを設けない継手を有する事を特徴とする請求項1から請求項3に記載の筆記具。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、筆記部であるペン先を有しており、インク収容管にインク等液体を直接保蔵す

るタイプの筆記具または筆記具状の化粧品等の容器においてしばしば問題となる、筆記しない時やペン先を上向きにした時に、インクが後端側へ流れ、空気孔から漏れ出す所謂逆流を防止する逆流防止機構を有する筆記具に関する改良であって、特に筆記時のインクの流れや逆流防止効果を十分に発揮させるためや組立時に内部機構が変形破壊されるのを防止する改良に関するものである。

【0002】

【従来の技術】 従来、筆記具や筆記具に類似した化粧品等の容器では、インク等の液体（以後インクと呼ぶ）を中綿と呼ばれる繊維束に吸蔵させて、毛細管力の差を利用してペン先にインクを導出させる機構が多く用いられてきたが、インクの残量が多く、インクが見えず、インク流量が初期は多いが使用に従って薄くなっていく等の欠点があるため、従来は油性ボールペンのみの機構であったインクを直接インク収容管に保蔵するタイプの筆記具が各種発明されて上市されている。しかしこのインクを直接保蔵するタイプでは、ペン先を上向きにして長期保管したり、振動を与えたり、上向きで筆記した場合は逆流と呼ばれるインクが後端の空気孔から漏れだして筆記不能になったり服を汚す問題があることが知られている。これを解決するためにインクを 5000cp 以上の高粘度としたり、後端に 그리스 状のフォロワーをさらに設けたりした物も見られるがこれらは根本的な解決とはなっておらず、逆流防止機構と呼ばれるボールと弁の組み合わせやスプリングと筆記するボールの組み合わせなどの発明（実公平4-52067、実開平6-68874、実開平7-28675、特開平7-237386など）を本出願人及び発明者は開示している。これらの発明は既に製品として市販されているもの及びその発展改良の発明であるが、近年さらに金、銀、パステル色などのインクでは金属粉や無機物などの粒子や比重の大きな顔料系着色剤を分散させたインクが開発されてきたが、これらのインクでは粒子の発色性を確保するためにどうしても比較的大きな $0.3\mu\text{m}$ から $3\mu\text{m}$ 程度の粒径の着色剤を使用しなければならず、このやや大きな粒子を通過させるため、また比重の大きな粒子を分散させるため他の一般色よりは粘度を高めたインクとしなければならぬため、インクの導出が困難となってしまう問題やインクの比重が一般の色よりも 10% から 100% も上がってしまい、逆止ボールが軽い比重の素材であったり内部に空気の巣があったり、表面の微細孔に空気が付着した場合などでは、逆止ボールの移動に時間がかかって、ペン先の先端には空気が多量に入ってしまった不具合を起こすような逆流防止機構における機構の作動の感度が鈍くなる問題や、あまりにも逆止ボールの比重が重いと遠心脱泡の際に逆止機構の流路が強度不足であったり耐薬品性が不足して脆くなっていたり耐熱性がなく変形しやすかったりして製造時に逆止機構が破壊される問題なども生じてきた。使用時にペン先や空気孔からの水

分の揮発が多いとさらに比重と粘度が上がって逆止機構が有効に作動しない問題もある。さらに従来の継手では水分の揮発抑制と耐インク性と耐熱性と成形性を重視してポリプロピレンやポリアセタールや変性ポリフェニレンエーテルなどの樹脂成形部品が用いられているが、その場合に成形時に金型内に充填する時の充填孔となるゲートの位置によっては、その場所から割れてきたり、突起状に残ったゲートで挿入時に傷を付けてインクが漏れてきたり、組み立て時に小さなゲートカスが削ぎ取られてインク中に浮遊し、筆記と共にペン先部に詰まって筆記不能を起こす問題も生じている。

【0003】

【発明が解決しようとする課題】そこで本発明は、主に普及型の筆記具の改良を目的としており、インクの逆流の問題を解決するだけではなく、各種のインクとの組み合わせでも筆記性の問題を発生させない上、近年上市されている水性のインクで、通常の油性ボールペンで用いられるインクよりも粘度が低く、中綿式水性インクよりも粘度の高い中粘度タイプの直液式ボールペンが上市されているが、これらにはインクとした場合にはインクの粘度が中程度でインクが移動しやすく、保存中や移動中の衝撃でペン先内に空気が入り込みやすく、逆流防止機構が十分に機能を発揮する状態までの間にペン先部への空気の巻き込み発生させる問題や粒子が重く大きい着色剤を使用したやや比重が重く高めの粘度のインクでの逆流防止機構の問題を解決し、さらに組立性や性能安定性を考慮して複雑な機構とならない、安価で逆流やカスレの生じない筆記具を提供する、さらには製造時の逆止機構の破壊やインク漏れの問題、保存中に膨潤や割れによるインク漏れの問題、ペン先部が乾燥してきた時にも筆記性や逆流防止性能に問題を生じない筆記具を提供する、という課題を解決する。

【0004】

【課題を解決するための手段】筆記部であるペン先を有しており、インク収容管にインク等液体を直接保蔵するタイプの筆記具または筆記具状の化粧品等において、上記の課題解決を達成する為に、本発明の筆記具は、逆止機構に用いられ逆止機構内を重力に従って移動する球状の逆止ボール又は非球状の逆止コマの部品（以後逆止ボールと呼ぶ）の比重Gとインクの比重Wに着目して、水の比重を1とした各比重間に逆止ボールの比重Gが1より小さく、かつインクの比重Wの3倍よりも大きく（重く）設定した。逆止機構の構成としては、継手内部に逆止ボールを遊嵌してペン先側に逆止ボールが移動した場合には流路が確保できる溝又は突起があり、後端側に逆止ボールが移動した場合には継手又はシールコマ内のシール面によってインク流路が閉塞されて逆流を防止する機構や、ペン先内に逆止ボールを遊嵌してペン先の後端をシール面を形成するように絞り込んだ逆止機構や、ペン先の筆記部となるボールを先端のカシメ部と後

方のインク流路を有する受け座の間で遊嵌したボールペンタイプの筆記具で筆記ボールを後方からスプリングで押圧する事で非筆記時に先端側のカシメ内壁と筆記ボールで閉塞して逆流を防止するスプリングチップのタイプや、逆止ボールを球ではなく前端にはインク流路を後端にはシール面を有した逆止コマとした物などが利用できる。さらに、金銀などのインクの場合にはインク中に平均粒径で0.3から3 μ mの通常の顔料や染料よりもやや粒子が大きくインクよりも比重の重い金属や無機材などの着色剤が使用されているため、これらの大きめで重い粒子のインクではインクの粘度を他の顔料インクや染料インクよりもやや高めとする必要があり、これらの場合には内部でのインクの流れの抵抗が大きい上、インクの比重が一般的なインクよりも重く、逆止ボールの動きが遅くなると逆流防止機構が完全に作動する前にペン先の先端から空気が入ってしまう逆流防止機構の感度に影響するので本発明の逆止機構の構成とすることは非常に有効である。ペン先部が乾燥する事で増粘してさらに粘度と比重が高くなる事を防止するためにインクには補助溶剤として水よりも難揮発性の溶剤が用いられるが、本発明では水よりも粘度の高い溶剤を1種類以上合計で3%から40%配合した。またペン先先端とインク収容管後端の間に設けられる継手を用いた場合は、この継手の材質を合成樹脂製として、逆止機構のインク流路やシール部を形成することが可能であり、その時の成形用ゲートの位置を、インク収容管との圧入部や逆止機構のインク流路や逆止シール面の近傍表面には設けない継手とした。

【0005】

【実施例】以下、図示した実施例について詳説する。図1から図3は本発明の第1実施例を示している。図に示すように透明または半透明樹脂製のインク収容管の内部にインクを保蔵する筆記具であり、水性中粘度インクを収容した直液式リフィールである。擬塑性といわれる剪断減粘性を付与した中粘度インクとリフィール後方には揮発しにくいグリス状のフォロワーとフォロワーに浮遊するようにフォロワーと略同等の比重を有するPPやPE等の樹脂製のフォロワー棒とを内蔵し、筆記部となる筆記ボールを保持するチップには内部に筆記ボールを円周状のカシメ部によって抜け止めされるとともに筆記ボールを回転自在に遊嵌してペン先内部は筆記に必要な流路を確保してある。インク収容管先端側には継手が圧入されており、内部の略中央に図2の様な断面を有するインク導入溝を持つ受け突起を設け、ペン先へは受け突起の溝によってインクが導かれる。この継手にはシールコマが後方内部に圧入固定されており、シールコマにはテーパー状のシール面が形成され、このシール面と受け突起の溝の間で形成される弁室内に遊嵌された逆止ボールによって通常の筆記時にはインク収容部から筆記部となるボールまでを連通する構造としたうえで、上向きでは

逆止ボールがシール面に密接することによってインク流路が閉塞されてインクの移動を防ぐ事で逆流を防止した構造の逆流防止機構を有したボールペンである。

【0006】ここで使用しているインクは、一般的な中粘度インクと金銀など着色剤として球に換算した時の平均粒径が0.3から3 μ mの鱗片状のアルミ粉を用いて23℃のインクの粘度を高剪断時で100から500cp、低剪断時で200から20000cpの剪断減粘性を有している。一般的なインクは比重1.03から1.2程度であるが、金銀インクなどでは水よりも比重が重く、比重2.5から3程度の重いアルミ粉やマイカ粉を3重量%から15重量%程度含有する上、さらに各種の添加材が添加されることでインクの比重は重くなる。このような粒子の重く大きい中粘度インクとしては比較的高めの粘度のインクとしてもインクの流れに抵抗を生じさせないために逆止機構の流路の最小投影断面積を最適化した設定とした。ここで、インクの比重は水や一般的な溶剤が比重1前後であり、1以下にすることは困難であることから他の添加剤を調整して1.1から2.0の比重のインクとしてある。逆止ボールはインク中で重力に従って沈降する事で上向きの時に後方へ移動してインク孔を閉塞し、下向きの時にインク流路が確保できる前方へ移動する事で逆流防止機構の作動をする事から、少なくともインクより重い比重が必須であるが、本発明ではインクの比重の3倍よりも重い比重の材質かつ比重1.1を越えない材質とした。具体的にはインクによって変化するが比重3.3から比重1.1の材質でインクに対する耐食性のあるステンレス、銅、真鍮、ジルコニアセラミック、金属入り樹脂などが選定できる。インク比重に比較して逆止ボールの比重が十分でない場合（インク比重の3倍以下）は、沈降のスピードが遅く上向きにした場合に逆止ボールがシール面に接触して閉塞するまでの時間がかかってしまい、逆止機構部のまわりのインクが後方へ移動してペン先には空気が入り込んでから逆止機構が作動してしまう（所謂感度が悪い状態）の問題が発生し、逆止ボールの比重が1.1よりも重すぎると組み立て中の遠心脱泡する時に10Gから多いときには300Gの遠心力をかけるため、逆止ボールが継手内の受け突起にくいいて動けなくなったり、受け突起を破壊したりするため、逆止ボールの重量を前側で受ける部分を合成樹脂製とした場合には、その樹脂の材質にはかなり剛性の高い物が要求されるため、一般的な筆記具では逆止ボールの比重を1.1を越えない物とした方がコストの点で有利である。

【0007】本発明の第2の実施例としては、図4に示すようにペン先の内部に軸方向に連続した異形断面や繊維束等の毛細管を有し外側を非浸透性の樹脂や金属で被覆したペン先を筆記部としており、ペン先の後方にはインク収容管を有してその内部にインクを直接保蔵する所謂サインペンやマーカーとしたもので、逆止機構の構成

は第1実施例と全く同様とすることで、効果は上述の第1実施例と同じ物である。また逆止機構については継手内の弁室を偏心させて逆止ボールが前方に移動してもペン先後端内径を塞がない構成とした筆記具でも良い。

【0008】本発明の第3実施例としては、図5に示すように、約1gから40gの荷重で押圧するチップスプリングを内蔵して、筆記ボールとのシール面となる円周状のカシメ部と筆記ボールとによってボールバルブ機構を形成して耐衝撃性アップやインクの揮発防止やインクの逆流を防止させる構造の逆止機構とした物である。このチップスプリングは通常は ϕ 0.3 \sim ϕ 1.2のごく小さい筆記ボールを直接押圧する為に、先端部に直線部を一体に設けたスプリングとして有り、その抜け止めのためにチップの後端部はカシメによって抜け止めして有る。この場合の逆止ボールは先端の筆記ボールであり、本発明の構成を満足させることで効果が発揮される。さらに輸送中のペン先保護や揮発防止を目的として先端に80℃から150℃にて溶融するホットメルトタイプの先端シール剤16を付着させた場合には長期保存性のアップやユーザーまでの輸送によるトラブルが防止できる。

【0009】本発明の第4実施例としては、図6に示すように、逆止ボールではなく、後端側にシール面を閉塞するテーパー部を有しており、さらにペン先側前方にはインク流路となる溝又は突起を有した逆止コマとしたもので、本発明の構成を満足させることで同様の効果を有している。さらに、ここで継手の射出成形のゲートを外部の最外径部に設けて、インク収容管との圧入部、ペン先との圧入部、逆止機構の近傍ではない部分としたことで、組立時のゲートに関する、インク漏れやゲート付近の残留応力による割れやシール面の異常などの問題を生じない構成になっている。

【0010】具体的な実験例として、比重1.1の黒インクで比重2.58のアルミ製逆止ボールの組み合わせでは逆止ボールの移動に時間差が生じてペン先に空気が入ってしまい、比重3.5のジルコニアセラミック製逆止ボールではごく僅かに空気が入ったものの実使用には問題なく、比重6.5以上のステンレスや銅製などでは全く問題なく、比重1.9のタングステン製逆止ボールでは製造時の遠心脱泡では継手内部の受け突起が変形してしまい筆記性に問題が生じた。また比重1.9の金色のインクではアルミ、ジルコニアセラミックで問題が発生し、ステンレスや銅などでは問題なく、タングステン製では上記と同じで継手内部を破壊してしまった。インクの比重を2.5に重くしたものでは遠心脱泡時にインク自身が分離して成分の分散ができなくなってしまった。インクの溶剤量を本発明の範囲以外にしたものではペン先部からの水分の蒸発によって保存したときにインクの増粘が発生したり、紙面のインクが乾かなくなる等の問題が生じた。その他の実施例（図示せず）としては、継

手を使用せず、ペン先内部に逆止ボールを遊嵌してペン先の後端を径方向内方に全周にわたってシール面を形成させて逆止ボールを抜け止めた物や、継手内のインク導入溝を持つ受け突起を別部品とした物やチップスプリングのストレート部を作らず別部品の押しコマとしてスプリングをペン先から出して継手内部で受けた物等の実施例の筆記具でも本発明の同様の効果が期待される。

【0011】

【作用】実施例に於いて、本発明の作用を説明する。逆流防止機構を有することで一般的には、筆記具の逆流は防止できると考えられていたが、近年の様々なインクを使用した場合には逆止ボール及びインクの比重を十分に差を付けた上で、あまり高比重になりすぎて組立の遠心脱泡の際に問題を生じさせない事で、逆止機構の作動に遅れが生じてしまう問題や製造時の部品の破壊などのトラブルを防止できる。さらに逆止ボールの内部に細かい巣があったりまわりに細かい気泡が付いても予定外の浮力に影響されずに安定して作動する逆流防止機構とする事が可能となる。さらにインクの比重、粘度、着色剤の粒径、溶剤の種類や量を本発明の範囲とすることで、逆止機構の作動を有効にすると共に、ペン先部の揮発によってインクがさらに高比重となりにくくかつなつたとしても逆止機構の作動遅延を防止できる上に、これらの相互作用によってカスレや逆流を防止する作用が期待できる。また継手のゲート部を限定することで逆止機構やインク漏れの影響のない筆記具が安価に得られ、有効な筆記具とすることが可能である。

【0012】

【発明の効果】本発明の筆記具の構成及び作用は以上の如くであり、服を汚す逆流など重大な事故にはならない効果があり、安全性の高い筆記具の機能を満足させるだけではなく、ユーザーの使用が簡便に行える使いやすい筆記具を提供することが可能となる。さらに製造上の問題もなく、インク種によって各種の部品を組み合わせる必要がないすべてのインクで共通した筆記具とすることが可能となって、部品構成が簡略化されるだけでな

く、安価で機能性の良い長期の耐久性を考慮された安定した製品を提供できる。

【図面の簡単な説明】

【図1】本発明の第1実施例である筆記具の先端部を示す縦断面図である。

【図2】本発明の第1実施例である筆記具の逆止機構部断面A-Aを示す横断面図である。

【図3】本発明の第1実施例である筆記具の全体を示す縦断面図である。

【図4】本発明の第2実施例である筆記具の先端部の縦断面図である。

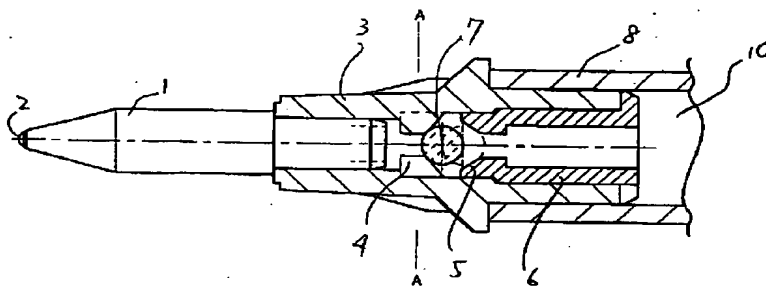
【図5】本発明の第3実施例である筆記具の先端部の縦断面図である。

【図6】本発明の第4実施例である筆記具の先端部の縦断面図である。

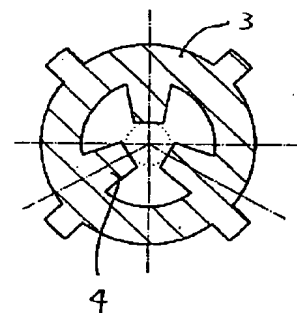
【符号の説明】

- 1 ペン先
- 2 筆記ボール
- 3 継手
- 4 受け突起
- 5 シールコマのシール面
- 6 シールコマ
- 7 逆止ボール
- 8 インク収容管
- 9 空気孔
- 10 インク
- 11 フォロワー
- 12 フォロワー棒
- 13 尾栓
- 14 ペン先カシメ部
- 15 スプリング
- 16 ストレート部
- 17 後端カシメ
- 18 逆止コマ
- 19 逆止コマテーパ部
- 20 射出成形用ゲート

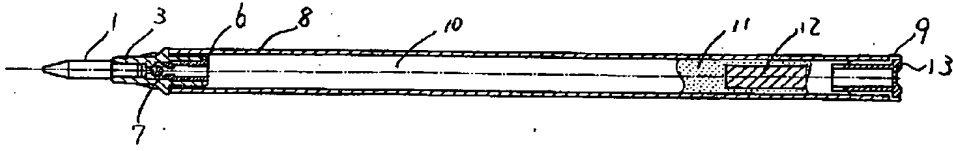
【図1】



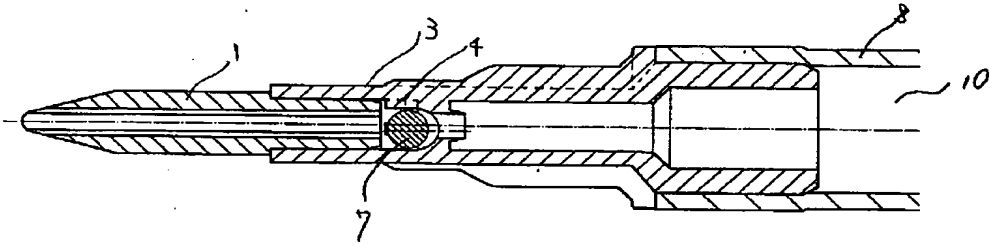
【図2】



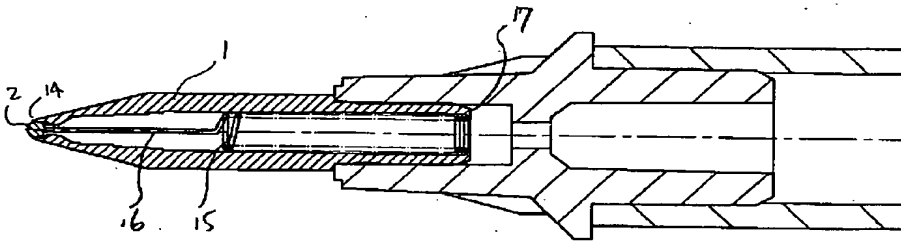
【図3】



【図4】



【図5】



【図6】

